

## CLAIMS

1. A dual sensor process temperature switch having a one-out-of-two voting architecture, said switch comprising:

a first temperature sensor for sensing a first process temperature in a fluid transport system, and for outputting a first analog sensor signal to each of a sensor input comparator and a first A/D converter;

a second temperature sensor for sensing a second process temperature in a fluid transport system, and for outputting a second analog sensor signal to each of a sensor input comparator and a second A/D converter;

a sensor input comparator for receiving said first analog sensor signal from said first temperature sensor, and for receiving said second analog sensor signal from said second temperature sensor;

a first A/D converter for receiving said first analog sensor signal from said first temperature sensor, and for converting said first analog sensor signal into a corresponding first digital sensor signal and then sending said first digital sensor signal to a first data processor;

a second A/D converter for receiving said second analog sensor signal from said second temperature sensor, and for converting said second analog sensor signal into a corresponding second digital sensor signal and then sending said second digital sensor signal to a second data processor;

a first data processor for receiving said first digital sensor signal, and for generating a first logical output signal based on a predetermined set point and then sending said first logical output signal to an integrated diagnostics unit;

a second data processor for receiving said second digital sensor signal, and for generating a second logical output signal based on a predetermined set point and then sending said second logical output signal to an integrated diagnostics unit;

an integrated diagnostics unit for receiving said first logical output signal from said first data processor and said second logical output signal from said second data processor, and for communicating with a master diagnostics switch to generate a switch control signal responsive to said first logical output signal and said second logical output signal;

a master diagnostics switch for communicating with said integrated diagnostics unit to generate a switch control signal responsive to said first logical output signal and said second logical output signal, and for outputting said switch control signal to a plurality of servant diagnostics switches;

a plurality of servant diagnostics switches responsive to a switch control signal received from said master diagnostics switch.

2. The dual sensor process temperature switch of Claim 1, further comprising a plurality of bypass switch circuits, wherein said plurality of bypass switch circuits enable an operator to perform maintenance on said dual sensor process temperature switch while a fluid transport system in which said dual sensor process temperature switch is disposed remains on-line.

3. The dual sensor process temperature switch of Claim 2, wherein said plurality of bypass switch circuits further comprise a first bypass switch circuit and a second bypass switch circuit, and wherein each of said first bypass switch circuit and said second bypass switch circuit are in electrical communication with said integrated diagnostics unit.

4. The dual sensor process temperature switch of Claim 3, wherein each of said first bypass switch circuit and said second bypass switch circuit are in electrical communication with said master diagnostics switch.

5. The dual sensor process temperature switch of Claim 1, wherein said sensor input comparator compares said first analog sensor signal received from said first temperature sensor and said second analog sensor signal received from said second temperature sensor, and wherein detection of a predetermined condition relating to each of said first analog sensor signal and said second analog sensor signal causes said sensor input comparator to output a warning signal to a sensor alarm.

6. The dual sensor process temperature switch of Claim 5, wherein when said sensor input comparator detects said predetermined condition relating to each of said first analog sensor signal and said second analog sensor signal, said sensor alarm is capable of communicating information to an operator regarding whether a fluid transport system in which said dual sensor process temperature switch is disposed is in either an open state or a closed state.

7. The dual sensor process temperature switch of Claim 5, wherein when said sensor input comparator detects said predetermined condition relating to each of said first analog sensor signal and said second analog sensor signal, said sensor alarm is capable of communicating information to an operator regarding whether each of said first temperature sensor and said second temperature sensor is operating within a predetermined operational state.

8. The dual sensor process temperature switch of Claim 1, wherein said integrated diagnostics unit and said master diagnostics switch are structurally integral.

9. The dual sensor process temperature switch of Claim 1, wherein said integrated diagnostics unit and said master diagnostics switch are not structurally integral.

10. The dual sensor process temperature switch of Claim 1, wherein said master diagnostics switch generates a switch control signal responsive to a diagnostics control signal generated by said integrated diagnostics unit.

11. The dual sensor process temperature switch of Claim 10, wherein said diagnostics control signal generated by said integrated diagnostics unit is output to a sensor alarm.

12. The dual sensor process temperature switch of Claim 10, wherein said diagnostics control signal generated by said integrated diagnostics unit is output to a diagnostics communicator.

13. The dual sensor process temperature switch of Claim 12, wherein said diagnostics communicator communicates said diagnostics control signal to a DCS.

14. The dual sensor process temperature switch of Claim 13, wherein said diagnostics control signal communicated by said diagnostics communicator to said DCS communicates information regarding pressure sensor deviations, bypass state indicators, and an open/closed state indicator relating to each of said servant diagnostics switches.